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THE DISTRIBUTION OF THE WAR BURDEN

1. Official estimates of the national income of the United Kingdom, for each of the years 1938 to 1943, have been published in the latest of an annual series of White Papers (Cmd. 6520, April 1944). From these official figures, together with other information, we can obtain estimates of changes, over the same period, in the net income of wage earners and of non-wage earners; and we can then estimate the relative 'war burden' which has fallen on each of these classes. The results are found to differ considerably from those of an earlier study,[1] which was based on the previous White Paper (Cmd. 6438, April 1943). For not only have the official estimates, especially of interest and profits, been very substantially revised, but the separate figures which have now been published of the pay and allowances of members of the Forces show that the independent estimates which previously had to be made for this item, on the basis of the scanty information then available, were evidently much too low. Certain other figures, notably those relating to the number of persons employed in industry, have also been revised, as explained below; and on at least one point a different procedure has been adopted. It should, in any case, be remembered that estimates of national income, and any resulting calculations, are bound to be approximate and sometimes even tentative in character. As a rule,

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[1] BULLETIN, Vol. 5, No. 7.

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however, we are not interested in the exact figures, but in making general comparisons or revealing the trend over a number of years.

2. We begin by estimating, first for wage earners, then for non-wage earners, the money income which remains after deduction of direct tax liabilities on current income. Estimates of the income tax liabilities on wages, and of other items, for the years 1938 and 1940—1942 were given, and the methods were described, in an earlier article, referred to above. In most cases, the same methods have been used to obtain corresponding estimates for 1939 and 1943.

It has been stated, with regard to income tax liabilities on wages, that the outstanding balance for the financial year 1943—44, which was discharged when the 'pay as you earn' system was introduced in April 1944, amounted to about £250 million.[1] This refers to all wage earners and, in the cases of manual wage earners, that is in most cases, covered a period of ten months.[2] Increasing this figure by 20%, therefore, we can take the total income tax liabilities on wages, in the calendar year 1943, as about £300 million. The estimates of income tax liabilities, shown in Table I, are very approximate;[3] they include the amounts which are set aside as post-war credits, which it seems better to regard as part of the sacrifices imposed by the war than as an addition to voluntary savings.

Contributions to social insurance, being a form of direct taxation, are also deducted from the estimates of wages; we thus arrive at the figures of net wages, shown below.

TABLE I

Estimates of Total Wages

	1938	1939	1940	1941	1942	1943
			(£ million)			
Total Wages, *gross*	1,728	1,826	2,107	2,412	2,701	2,909
Less:						
Income Tax Liabilities	3	3	65	170	240	300
Social Insurance conts.	42	43	44	49	49	47
Total Wages, *net*	1,683	1,780	1,998	2,193	2,412	2,562
Index of total net wages	100	106	119	130	143	152

3. Our purpose being to compare the net income of wage earners with that of non-wage earners, considering only incomes which are derived from industry, the pay and allowances of members of H.M. Forces and Auxiliary Services are excluded from both sets of estimates.

In order to obtain the net income of non-wage earners, we must first estimate their direct tax liabilities. Figures are given in the White Paper for the total direct tax liabilities on all incomes, including employees' contributions to social insurance, from which we must deduct the income tax liabilities of wage earners and their contributions to social insurance, as shown above. Since interest on the National Debt, being a transfer payment, is not included in the net national income, the income tax payable on the interest must also be deducted. This cannot be estimated exactly since the amount would depend, for example, on whether we take the average rate of income tax on the whole of a person's income, or the rate on marginal income. But a reasonable estimate can be obtained by applying the standard rates of income tax which were in force at the respective dates to the total National Debt interest; the resulting figures are shown below. From the total of direct tax liabilities, we must also deduct death duties and stamps on the transfer of property, which cannot properly be regarded as charges on current income. Finally, we deduct a very rough estimate of income tax liabilities on the pay of members of the Forces.[1] We thus obtain the estimate of direct tax liabilities on non-wage incomes, shown in Table II.

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[1] *A New System for the Taxation of the Weekly Wage Earners*, Cmd. 6469, September 1943.

[2] In other cases (clerks, typists, etc.) the outstanding balance covered a period of seven months.

[3] The small amounts shown for 1938 and 1939 are based on figures given in *The Taxation of Weekly Wage Earners*, Cmd. 6348, April 1942.

TABLE II

Estimates of Direct Tax Liabilities

	1938	1939	1940	1941	1942	1943
			(£ million)			
Total direct tax liabilities	572	717	1,082	1,557	1,861	2,037
Less:						
Income tax on wages	3	3	65	170	240	300
Ins. conts. of wage earners	42	43	44	49	49	47
Income tax on Nat. Debt. int.	59	68	92	117	145	170
Death and stamp duties	90	87	85	94	100	104
Income tax on Forces pay (apx.)	-	-	-	20	40	50
Direct tax liabilities on non-wage incomes	378	516	796	1,107	1,287	1,366

The term non-wage-incomes,—which is used here, includes rent, interest, profits and salaries, together with the earnings of shop assistants. Undistributed profits, though not accruing to persons, are also included as forming part of the net national income. After deducting the above estimates of direct tax liabilities, we obtain estimates of the total net income of non-wage earners, which are shown in Table III.

TABLE III

Estimates of Non-Wage Incomes

	1938	1939	1940	1941	1942	1943
			(£ million)			
Gross incomes	2,796	3,015	3,450	3,820	4,042	4,177
Direct Tax liabilities	378	516	796	1,107	1,287	1,366
Net incomes	2,418	2,499	2,654	2,713	2,755	2,811
Index of net incomes of non-wage earners	100	103	110	112	114	116

4. Next we require to deflate the indices of net money income for changes in market prices. The index of retail prices of goods and ser-

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[1] The percentage of income tax liabilities to the total pay and allowances of members of the Forces would probably be considerably less than the percentage which income tax liabilities of wage earners bears to total wages. We assume, quite arbitrarily, that the former percentage is half the latter, in each year. The resulting figures are given in round numbers.

vices, which is published in the White Paper, refers to prices at factor cost, and does not, therefore, include the effects of indirect taxes or subsidies. Other figures, however, are given in the White Paper, relating to personal expenditure on consumption at market prices and to expenditure on consumption at constant prices, from which an index can be derived of retail market prices, which includes the effects of indirect taxes and subsidies. This index, which is shown in the first line of Table IV, cannot necessarily be assumed to apply both to wage earners and to non-wage earners, whose incomes are distributed in different proportions on various items. On the other hand, the Ministry of Labour cost of living index, which is based on a fixed standard, seriously underestimates the increase in the cost of living of wage earners, during the war.

According to estimates which have been given in this BULLETIN,[1] the cost of living of wage earners increased by about 20% between 1938 and 1940, and by about 33% between 1938 and 1941. These estimates, which, if anything, were probably a little too low, differ only slightly from the general index of retail market prices, which covers the expenditure of all classes of the community and which is shown in Table IV (line 1). For the period 1938 to 1941, therefore, we shall assume that this general index can be used for deflating the index numbers of money wages; and, granted this assumption, the same index can be used for deflating the money income of non-wage earners, during the same period.

For the period 1938 to 1942 we estimated[2] that the cost of living of wage-earners increased by 40—45%. A similar estimate[3] for 1943 shows an increase since 1938 of 45—50%. Comparing these figures with the general index of retail market prices, shown below, there appears to be some evidence for assuming that, since 1941, the cost of living of wage earners has risen less than the index of market prices as a whole, and that the cost of living of non-wage earners, therefore, has risen more than is shown by the general index. For wage earners, we shall take the upper of the two limits, shown above, for 1942 and 1943, since it seems more likely that our estimates are too low than too high. As the total expenditure on consumption appears to be divided in roughly equal proportions between wage earners and non-wage earners, we may assume that the general index of prices is mid-way between the cost of living index of wage earners and that of non-wage earners.[4] The figures adopted are shown in Table IV.

In previous work, we adjusted the cost of living index in order to allow for the effects of rationing and shortages in restricting the consumer's freedom of choice. Since the necessary data are lacking, it is

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[1] Vol. 4, No. 8, p. 168.

[2] BULLETIN Vol. 5, No. 7, pp. 109—110.

[3] Based on the same method as the estimate for 1942, except that, with the introduction of utility clothing, it has been assumed that the correction applied to clothing prices is no longer necessary. The increase in food prices since 1942 was taken from the Ministry of Labour cost of living index.

[4] Strictly speaking the index for non-wage earners should include the prices of investment goods. But since savings are not a very large proportion of income, and since the increases in the prices of investment goods have not been very different from those of retail prices, this point can be neglected.

TABLE IV

Index Numbers of Retail Market Prices

	1938	1939	1940	1941	1942	1943
General Index of Market Prices	100	103	120	136	146½	153½
Cost of Living of Wage Earners	,,	,,	,,	,,	145	150
Cost of Living of Non-Wage Earners	,,	,,	,,	,,	148	157

impossible to obtain any adequate estimate of the effects of rationing and the estimates which were previously used were necessarily somewhat hypothetical. Here we propose to leave this factor out of account; but, at the same time, the reader is warned that, if the effects of rationing were included, the index numbers of real income would be lower, and the estimates of the war burden higher, than are shown below.

After deflating the index numbers of net money income for changes in the cost of living, as estimated above, we obtain the following indices showing changes in aggregate net income, in real terms. These figures do not, of course, cover the whole of the national income, since payments to the Forces are excluded.

TABLE V

Index Numbers of Real Net Income

	1938	1939	1940	1941	1942	1943
Wages	100	103	99	96	99	101
Other Incomes	100	100	92	83	77	74

5. Some idea may now be obtained of the distribution of the war burden between the two classes. The conventional method of assessing the cost of the war in terms of the total amounts paid in direct and indirect taxation suffers, on both theoretical and practical grounds, from a number of objections. On the one hand, there are serious pitfalls in estimating the division of indirect taxes between different income groups; and, on the other hand, the sum of direct and indirect taxes does not (necessarily) represent the whole of the war burden. The method which will be used here, and which avoids these difficulties, was suggested by Mr. Kalecki.

In normal conditions, if there are no very great changes in the relative importance of different industries, we should expect real income, both of wage earners and of non-wage earners, to vary approximately in proportion to changes in the volume of employment, measured in man-hours. For the share of wages in the national income has remained fairly stable, and we can assume that industry was working under more or less constant returns.[1] In this way, we can estimate the increase in real income which might reasonably have been expected under peace-time conditions. If we then compare this *potential* real income with the actual changes in real income, estimated above, the difference may be regarded as the sacrifice imposed by the war.

Strictly speaking, when estimating potential real income, we should make allowance for the normal rate of increase in productivity to be expected under peace-time conditions. Since this can only be conjectured, alternative estimates of the war burden will be given, the first making no allowance for changes in productivity and the second allowing for a hypothetical increase in productivity, at a constant rate.[1]

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[1] Even if this assumption were incorrect, the proportionate distribution of the total net output could hardly be affected.

6. During the war, the Ministry of Labour has ceased publishing figures of the numbers of insured persons in employment and it is only by indirect methods that any information can be obtained about recent changes in the numbers employed. An index of employment, based on published figures of employees' contributions to the General Scheme of Unemployment Insurance, has been published in this BULLETIN[2] but gives only an approximate picture and relates to insured workers, who include small salary earners and exclude domestic servants, while we require to know the changes in the number of wage earners employed. Since there must have been a considerable decline in the number of domestic servants, the index derived from contributions to unemployment insurance is probably too high. This will have been partly offset by the fact that, during the war, the proportion of men in employment has declined while that of women has increased; but since the rate of contribution of women (aged 21—60) to the General Scheme of Unemployment Insurance is only 10% less than that of men (aged 21—65), the effect of the substitution of women for men on the index of employment must have been very slight—probably not more than 1%.

Another rough guide to the changes in the number of wage earners in employment can be obtained by comparing the movement of the total wage bill with that of the average earnings of all workers. From the figures given in a previous number of the BULLETIN,[3] we can obtain a fairly reliable estimate of the increase in average earnings, between 1938 and 1943, in all the important industries, except for personal and domestic service. Allowing for the effects of transferences between different industries and of changes in the proportionate numbers in different sex and age groups, the increase in average earnings between 1938 and 1943 in agriculture, mining, railways, manufacturing, building and public utilities, all combined,[4] may be estimated at 76%. In personal and domestic service, the increase was very much less, probably of the order of 30%. The increase in average earnings, from 1938 to 1943, for all industries together, may be put at roughly 71%. Comparing this with the increase in the total wage bill, over the same period, of 68%, the number of wage earners would appear to have fallen by about 2%. While this is only a rough estimate, it is probably a better guide, for our purpose, than the index obtained from insurance contributions, which shows an increase in the numbers employed, between

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[1] Further, in war time an average hour's work almost certainly results in a greater expenditure of effort, and a larger output, than in peace time ; but the effect which this would have had on potential real income cannot, of course, be estimated.

[2] The method is described in detail in BULLETIN Vol. 3, No. 13. The effects of changes in the rates of contribution and in the scope of insurance are eliminated.

[3] Vol. 6, Nol 7, pp. 107—113.

[4] That is, in the industries included in the Ministry of Labour's enquiries, together with agriculture, coal mining, and railways. Earnings enquiries were undertaken in October 1938 and July 1943 and the averages at each of these dates are assumed to be representative of the whole year.

1938 and 1943, of 2½%.[1] The difference, as noted above, can probably be explained by the reduction in the number of domestic servants. For 1943, therefore, we shall adopt 98 (1938=100) as the index of the number of workers employed. We shall assume that the discrepancy of 4½% between this figure and that derived from insurance contributions was about the same in 1942; and that the discrepancy may be gradually reduced, back to 1939. The numbers relating to insured persons[2] and those adopted for the total number of wage earners in employment are both shown below.

TABLE VI

Index Numbers of Employment

	1938	1939	1940	1941	1942	1943
Number of Insured persons employed (from insurance conts.)	100	102	100½	105	106	102½
Number of Wage-earners employed (figures adopted)	100	102	99	102	101	98

Average hours of work, in the industries included in the Ministry of Labour's enquiries, increased by 7½% between October 1938 and July 1943; similar figures are not available for the intermediate years. The estimates previously given[3] of changes in average working time, which were derived from a comparison of changes in wage rates and weekly earnings from 1938 to 1940, 1941 and 1942, appear to have been slightly too high and each of the estimates will be reduced, therefore, by 1%. For 1939 we insert a figure which is no more than a guess.

7. Multiplying together the indices of the number of wage-earners employed and those of average working time, we obtain the series, shown in Table VII, which represents changes in the volume of employment, measured in man-hours. Leaving aside, for the present, the problem of changes in productivity, we assume that the index of the volume of employment may be taken to represent the potential real income both of wage-earners and of non-wage earners. Comparison of this index with the actual changes in real net income, estimated above (Table V), results in preliminary estimates of the war burden, shown in Table VII. The index of net real wages in 1941, for example, is 96; the index of the volume of employment in the same year is 109 (1938=100 in each case); and the difference of 13 points amounts to 12% of 109, which is taken as a provisional estimate of potential real income.

These estimates make no allowance for the effects of rationing or for changes in productivity. The results of the censuses of production in 1924 and 1935 provide some idea of the normal rate of increase in productivity in peace-time. Among the industries included in the censuses, average net output per manual operative increased by about

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[1] Up to the first half of 1943, figures have been given in BULLETIN Vol. 5, No. 13 p. 217. For the second half of 1943, the index of employees' contributions is 100 (1938=100), to which 1% is added for part-time women (counting two part-time women as one whole time) who are exempt from insurance. The index for the first half of the year was 104, that for the second half is 101, so that the index for the whole year is 102½ (1938=100).

[2] Including part-time women workers.

[3] BULLETIN Vol. 5, No. 7, p. 111.

TABLE VII

Index Numbers (1938=100)

	1939	1940	1941	1942	1943
Number Employed ...	102	99	102	101	98
Average Working Time	101	105	107	109	108
Volume of Employment	103	104	109	110	106
Preliminary Estimates of War Burden					
War Burden on Wage Earners	0%	5%	12%	10%	5%
War Burden on Non-Wage Earners	3%	12%	24%	30%	30%

35% during these eleven years.[1] Average weekly hours of work increased, in the same period, by 4½%,[2] so that productivity (net output per man-hour) increased by about 29%, or at an average rate of 2.3% per annum. The industries covered by the censuses provided less than half of the national income and in other industries and services changes in productivity would probably have been much less. For the normal rate of increase in productivity in industry as a whole, 1½% per annum would seem to be a reasonable guess.

Allowing for a steady increase in productivity, at this assumed rate, we obtain the revised indices of potential real income, shown in Table VIII. The estimates of the war burden, shown in the same Table, are obtained by comparing the index numbers of real net income shown above, with the revised index numbers of potential real income.

TABLE VIII

Revised Estimates of War Burden, allowing for Changes in Productivity

	1939	1940	1941	1942	1943
Index of potential real income (1938=100)	104½	107	114	117	114
War Burden on Wage Earners	1%	7%	16%	15%	11%
War Burden on Non-Wage Earners	4%	14%	27%	34%	35%

The allowance made for changes in productivity is to some extent hypothetical. It should, moreover, be borne in mind that, as many of the figures which have been used in the preceding calculations are approximate, the final results are subject to a fairly wide margin of error. There is, however, some general indication that the burden on wage earners, compared with that on non-wage earners, has declined over the past few years; the relative burden on wage-earners was apparently highest in 1941. If the effects of rationing had been included, the burden on both classes would be increased and the burden on wage earners, relative to non-wage earners, would also be increased.

8. We append a table showing, on the basis of the foregoing estimates of the number of wage earners employed, the movement of average money wages, before deduction of direct taxes, and of average real wages, before and after deduction of direct taxes. The figures for 1943 depend on a direct estimate of the increase in average money wages. Again, no allowance has been made for the effects of rationing; and, if

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[1] A. L. Bowley, *Studies in the National Income*, p. 146.

[2] As shown by the Ministry of Labour's enquiries.

this is taken into account, the estimates will be found to differ only slightly from those previously given, for the years 1940 to 1942.

TABLE IX

Index Numbers of Average Wages

	1938	1939	1940	1941	1942	1943
Average money wages, *gross*	100	104	123	137	155	171
Average real wages, *gross*	100	101	103	101	107	114
Average real wages, *net*	100	101	100	94	98	97

J. L. NICHOLSON.

QUALITY MILK

Discussions in the House of Commons and elsewhere within recent months, have focussed attention once more upon the provision of a milk supply which it is not dangerous to consume.

Milk inevitably carries with it a large number of bacteria. Many of these are not harmful—indeed without some of them Cheese could never be produced: particularly, a small amount of cow dung is held by many to have no ill-effect upon the keeping qualities of the milk. But Bovine Tuberculosis and possibly Undulant Fever are capable of being transmitted from a diseased cow to the human consumer of its milk. To make milk safe for human consumption two different methods of approach may be used. Heat treatment of the milk itself will destroy any organisms inimical or otherwise. But if milk be heated *twice* before consumption much of its nutritional value is lost, and since at least a half of the milk consumed in the average pre-war household was not consumed raw and is heated *after* coming into the household,[1] obviously this is a factor of considerable importance. Moreover, both the 'old' and the 'new' methods of Pasteurization require a degree of care and skill in their operation that is more to be looked for in the research laboratory than on the farm or in the dairy. Pasteurization then is of limited application. Cleaning up the milk after it leaves the cow resembles very much the proverbial closing of the stable door.

To attack the problem at its root is the ideal method. This entails eradicating the diseased animals, and providing milk (at least for liquid consumption) from herds, all members of which are known to be free from bovine tuberculosis. This has been the criterion adopted for quality milk in this country for over 20 years since the Milk (Special Designations) Order 1923, though that order has been somewhat amended in the interval. Every animal in the herd has to undergo an examination and a prescribed tuberculin test carried out at six-monthly intervals by an authorized veterinary surgeon. Any animal reacting to the test has to be removed from the herd at once, no animal may be added to the herd until it has passed the test, and the herd must be isolated from other cattle. Various other conditions, not specifically relating to tuberculous infection, but directed to protect the milk from other forms of contamination, have to be fulfilled, and no form of heat treatment may be used, if the designation Certified or Grade 'A' (T.T.), later called Tuberculin Tested, carrying with it special bonuses, is to be applied. This provides no complete safeguard against infection, but it was estimated before the war that not more than 3 per 10,000 animals in tuberculin tested herds could be considered actively dangerous.

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[1] 'Milk Consumption Habits,' K. A. H. Murray and R. S. G. Rutherford, Agricultural Economics Research Institute, 1941, p. 36, Raw 19%, Stewed Fruit, Breakfast foods, etc. 7%, Hot Drinks 11%, Cooking, Baking etc. 27%, Tea, Coffee, Cocoa 36%.

At the outbreak of war there were in existence three different types of 'safe' milk: Tuberculin Tested Milk, Milk from Attested Herds and Accredited Milk. The former we have already explained: the second was milk from herds showing no reactors when officially tested, but not complying with the additional conditions required to obtain a T.T. license; the third related to herds with not more than 10% of reactors.[1] Each receive bonuses on their output ranging from 1d. per gallon in the case of Accredited producers to 3d. a gallon for T.T. producers. These have been provided by the Treasury under the various Milk Acts, and the purpose of this article is to examine whether this method of paying a bonus on each gallon of 'safe' milk is the best way by which to achieve the ultimate cleaning up of the British milk supply.

What are the costs to the farmer of changing over from the production of 'ordinary' milk to the production of T.T. milk? There are costs involved at the outset—the 'costs of new capital equipment'—and there are additional production costs.

THE 'COSTS OF NEW CAPITAL EQUIPMENT'

The new equipment needed in order to reach the required standards largely depends upon the level from which the producer starts. The man with cowsheds and dairies already in a reasonable condition, and with a herd that contains few reactors at the first test, will be able to qualify as a Tuberculin Tested producer with little extra capital outlay. The man whose farm buildings were originally built for arable production and have been inconveniently adapted for dairying may well have considerable expenses to undergo. Dixey[2], working on a sample of 35[3] farmers, who were producing Certified Grade A (T.T.) milk in 1935, and who had kept complete records of the costs of the transfer obtains a distribution of costs (adjusted to 1935 prices). See Table I.

The average cost per cow, at 1935 prices, was £13 1s., the components being as follows:—for cowsheds, £5 16s. 0d.; for dairies, £1 4s. 3d.; for equipment £2 11s. 0d.; and for the herd £3 9s. 9d.

The items perhaps need further explanation. Using the full sample[4] the existing *cowsheds* needed alteration in 43 per cent of cases, another building was converted into a cowshed in a further 22 per cent, a new cowshed built in 9 per cent, various building operations were required in another 10 per cent, leaving 16 per cent where no alterations were required.

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[1] And corresponding to the older Grade A classification.

[2] 'Tuberculin Tested Milk, A Study of Reorganisation for its Production,' R. N. Dixey, Agricultural Economics Research Institute, 1937.

[3] Out of the 484 farmers in England and Wales who held such licences in 1934.

[4] Information on part of the costs was available for a further 145 giving 180 in all.

TABLE I

Capital Costs incurred in transferring to the production of T.T. Milk.

Capital Costs per Cow	*Number of Farms*
Less than £5	9
Between £5 and £10	7
,, £10 ,, £15	6
,, £15 ,, £20	5
,, £20 ,, £25	2
,, £25 ,, £30	4
,, £30 ,, £35	1
,, £35 ,, £40	1
	35

These changes are not necessary to bring the cowsheds up to any special standard required for T.T. milk production. The standards for cowsheds are those laid down in the Milk and Dairies Order, 1926 for the production of *all* milk; but in practice, as we shall see below, since the labour requirements of producing T.T. milk are higher, it becomes necessary for the farmer to provide cowsheds that are more convenient to work and keep clean than the ordinary shed. Adequate water and drainage facilities were the main expenses under this heading. They showed a great range, but this item may well be less in the future when the new plans for rural water supply mature.

Of the *dairy buildings*, about one quarter of the existing dairies were improved, in another quarter other buildings adapted, and in a third quarter new dairies built. The range in costs was from £1 to £350 per farm[1], or from 9½d. to £8 10s. 0d. per cow.

Dairy equipment. In the study being quoted this is confined to (*a*) *permanent equipment* for washing and sterilising, for cooling milk, for filling bottles (where undertaken) and (*b*) *the initial supply of consumable stores* such as clippers, smocks, special milking pails and of bottles together with their caps, seals, crates and boxes where bottling is undertaken. The latter of these it is peculiarly difficult to allocate between capital outlay and the production cost in the first year, but Dixey with some reason reckons the purchase of that initial supply necessary to start production as a capital expenditure: it represents the 'stock in hand' that must be built up. The range of costs is very much complicated by the type of licence that was being sought.

Herd replacement is the cost of replacing reactors when the herd is first tested. Subsequent tests may still show reactors which have to be replaced if the licence is to be maintained, but these more properly belong to the 'cost of production.' Also, even in the absence of a change to Graded production there are normal herd replacement expenses in any herd. So far as possible these were also excluded. The figure of £3 9s. 9d. per cow may appear at first sight very low, but it is to be noted that it represents not the cost of buying in Tuberculin free heifers, but the difference between this cost and the disposal value of the reactors. Of course, purchase in the open market is not the only method available; in fact it is generally regarded as very unsatisfactory, since such purchases frequently react at the next test. A temporary reduction in the herd, and the postponement of replacement until home reared heifers are available is a more satisfactory method, the disposal receipts of reactors helping to balance the temporary loss of revenue from milk yields.

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[1] Per farm are more reliable figures, as most dairies have excess capacity.

These are the costs which aggregated to just over £13 per cow, at 1935 prices.[1] It does not seem worth while to attempt an estimate of present costs, for much of the building work cannot now physically be done and building costs after the war cannot be estimated, while the price of livestock are artificially inflated by E.P.T. effects. But £20—£30 per cow must represent the range of conversion at present prices. Some economy might be obtained by using movable milk bails rather than the fixed shed, though the difficulties of adequate water and sterilization facilities are not to be overlooked. A grand total of £20 million is probably not too high a figure, for the cost of cleaning up all herds.

THE HIGHER CURRENT COST OF PRODUCTION

The costs of T.T. milk production are available for the 5 years 1935/6 to 1938/9 and the first war year 1939/40[2]. The results are summarized in Table II. It would seem that the cost of producing T.T. milk has been higher, that the addition to cost has fallen steadily, and that after the initial year (which is a very small sample) this addition has been well below the 3d. a gallon premium paid. Most of the items that account for the increase are to be expected as costs of maintaining a disease free herd, and of maintaining a more sterile dairy[3]. *Labour costs* are higher, though the difference narrows in the later years: wage rates above the minimum must be paid in order to obtain men competent to undertake the necessary extra operations that quality milk production entails, and additional man hours are also involved. *Herd replacement* costs are, as we would expect, higher in the first years, but the difference falls sharply and even becomes negative in 1938/9 as the effects of continuous veterinary supervision upon the T.T. Herds becomes apparent, 'reactors' become less frequent, and the general standard of health improves. *Food costs* per gallon have been higher, and have shown little tendency to fall. The reason for this seems somewhat obscure. Bridges suggests that it may be that the bonus, being so much greater than the additional costs involved, encouraged wasteful feeding in the pre-war years. The sharp drop in the difference in 1939/40 when concentrates became scarce seems to support this view. But probably most of the explanation lies in 'the periodical necessity of having to remove cows, very often the best yielders, which have reacted to the test, the necessity of having to continue with others, perhaps low-yielders, because they have passed

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[1] To these should also be added the costs of reorganising the rest of the stock of the farm to give proper isolation, provision probably for the rearing of young stock, the costs of filling in or fencing off ponds, and the double fencing of boundaries.

[2] Milk Investigation Scheme: Costs of Milk Production in England and Wales: Interim Reports 1, 2, 3, 4, 5, 6 and Milk Production; A Study of Variations in Costs 1934/5 to 1938/9: A. Bridges, Agricultural Economics Research Institute.

[3] The declining difference between the Miscellaneous expenses is largely due to an increased standard among the ordinary producers: see 'Cowshed and Dairy Maintenance' in Table II. Also certain veterinary expenses are now provided by the State.

TABLE II *Costs of Production of T.T and Wholesale Milk*

	1934/5		1935/6		1936/7		1937/8		1938/9		1939/40	
	Whole Sale	T.T.	Whole Sale	T.T.	Whole Sale	T.T..	Whole Sale	T.T.	Whole Sale	T.T.	Whole Sale	
Number of Farms	490	18	427	35	437	64	409	81	382	123	360	139
Average Number of cows in herd	33	44	34	40	34	45	33	42	32	37	33	36
Yield per cow p.a.: gallons	642	622	646	613	632	617	642	621	646	622	591	584
Costs * of production:					pence per gallon							
Foods	5.85	6.59	5.42	6.15	6.04	6.86	6.87	7.93	5.95	6.65	7.89	8.43
Labour: Employees	1.61	2.70	1.64	2.51	1.73	2.30	1.64	2.14	1.66	2.04	1.96	2.55
Family	0.56	0.47	0.51	0.35	0.53	0.25	0.52	0.35	0.52	0.47	0.62	0.53
Total Labour	2.17	3.17	2.15	2.86	2.26	2.55	2.16	2.49	2.18	2.51	2.58	2.68
Miscellaneous:												
Bull upkeep	0.21	0.30	0.20	0.24	0.22	0.20	0.22	0.26	0.21	0.25		
Veterinary and Medical Expenses	0.07	0.45	0.08	0.27	0.10	0.28	0.09	0.22	0.09	0.15		
Consumable Dairy Stores	0.13	0.28	0.15	0.31	0.16	0.23	0.15	0.25	0.16	0.27		
General Dairy Expenses	0.06	0.29	0.06	0.17	0.09	0.17	0.08	0.16	0.08	0.12		
Milking Machine Expenses	0.04	0.12	0.05	0.08	0.06	0.11	0.08	0.13	0.05	0.13		
Cowshed and Dairy Maintenance	0.29	0.54	0.11	0.44	0.30	0.34	0.29	0.38	0.28	0.35		
General Farm Expenses	0.36	0.55	0.35	0.47	0.36	0.39	0.34	0.44	0.34	0.41		
Total Miscellaneous Expenses	1.16	2.53	1.18	1.98	1.29	1.72	1.25	1.84	1.24	1.68	1.49	1.87
Herd Replacement	0.98	1.35	1.06	1.33	0.83	1.22	0.97	1.03	0.98	0.88	0.57	0.65
Gross Farm Cost	10.16	13.64	9.81	12.32	10.42	12.35	11.25	13.29	10.35	11.72	12.53	13.63
Credits:—Calves	0.44	0.47	0.48	0.50	0.56	0.155	0.59	0.60	0.55	0.65	0.59	0.72
Manurial Residues	0.31	0.35	0.31	0.36	0.31	0.37	0.34	0.38	0.31	0.33	0.35	0.39
Total Credits	0.75	0.82	0.79	0.86	0.87	0.92	0.93	0.98	0.86	0.98	0.94	1.11
Net Farm Costs	9.41	12.82	9.02	11.46	9.55	11.43	10.32	12.31	9.49	10.74	11.59	12.52
Additional Cost of T.T. Production	3.41		2.49		1.88		1.99		1.25		0.93	

* For interpretation of these terms see Bridges: ibid.

the test, and the lack of scope in buying fresh cows to maintain production.'[1]

But these figures mask a large part of the problem. All farm cost data have a very considerable range around their averages. Taking the four years 1934/5 to 1938/9 as a whole, the distribution of costs is as follows :—

TABLE III

Percentage Distribution of Costs per gallon of T.T. and Wholesale Milk

	T.T.	Wholesale		T.T.	Wholesale
4d.—6d. per gallon	1	2	12d.—14d. per gall.	22	9
6d.—8d. ,, ,,	11	18	14d.—16d. ,, ,,	22	9
8d.—10d. ,, ,,	25	38	16d.—18d. ,, ,,	4	1
10d.—12d. ,, ,,	24	26	18d.—20d. ,, ,,	1	1
				100	100
			Mean Cost	11.2d.	9.9d.

The difference is significant, the difference in the means being 1.3d., but the scatter makes any statement about the difference in costs for any one producer a matter of some indeterminancy.

Secondly the T.T. herds are significantly larger, averaging about 40 cows per herd to the 30—35 cows per herd in the Wholesale Group. In Table II we have compared the costs of producing milk from the larger T.T. herd with the smaller wholesale herd. The correct comparison, if we are seeking to estimate the extra 'current costs' of producing T.T. milk would be between the wholesale group and T.T. herds of the *same* average size. The sample of T.T. herds is so small that a direct comparison of a series of herd size groups would not be very reliable, but since we have some knowledge of how costs of particular items change with the size of the herd in the wholesale group some general remarks may be made. 'Labour costs' decrease with increasing size of herd as milking machines become more economical. 'Miscellaneous expenses' tend to increase up to herds of about 20 cows, but total outlay then becomes relatively constant, and average costs decline over the range that is relevant. For these two factors then, the margin between wholesale herds and T.T. herds of about 30 cows would be larger than that shown in Table II. Foods showed almost constant costs, and no correction is necessary. Herd replacement shows increasing cost up to herds of 50—60 cows: some part of the higher herd replacement cost of the larger T.T. herds must be attributable to this factor, and the real margin must be *lower* than that shown in Table II. Thus it is probable that in 1937/8 as well as in 1938/9, the costs of herd replacement were in fact less for established T.T. herds than for the wholesale herds.

What then were the 'costs' of clean milk production before the war? About £13 per cow of new capital expenditure, and additional costs of about 1½d. per gallon. The subsidy paid was 3d. a gallon. By and large, for the *average* farmer this left available 1½d. a gallon which, on about 620 gallons per annum, is about £3 17s. 6d. per annum to cover the amortization and interest costs. The capital and any interest costs would in fact have been paid for within 4 years. One would have thought this was a sufficient incentive. But experience has shown that the incentive was *not* enough to secure an improvement of any but those producers whose herds were almost free of reactors and no doubt the risks of seeking a T.T. licence were enormous.[1] 'Herd Replacement' was probably over-emphasised by the farmers, but the difficulty of securing a market among consumers who were not aware of the superior qualities of T.T. milk, or not sufficiently aware to be willing to pay a higher price for it must have held many producers back. In some cases producers supplying 100—200 gallons a day of ordinary milk on wholesale contract, changed to T.T., and were able to dispose retail only of some 10—20 gallons a day. Clearly if the farmer is to be persuaded to produce clean milk, the consumer must not be discouraged from buying it by making it dearer. The time has well come when the Ministry of Agriculture should be able to say that its post-war aim is to make *all* the milk consumed raw, for butter or for cream, free from tuberculous infection. To secure this, as from 2 years after the end of hostilities in Europe, it should be an offence to sell milk for human consumption not from at least an Attested Herd. At the same time, the Ministry should announce its willingness to subsidise the actual capital extensions needed, charging a rate of interest at not more than 1%, if any at all. Meanwhile the public and in particular the priority classes should be actively encouraged to demand T.T. milk.[2]

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[1] Bridges, ibid, p. 60.

But the problem of the reacting cow still remains. The ideal solution would be to slaughter reactors in the same way as animals suffering from Foot and Mouth Disease are slaughtered. But whereas never more than 1 in a 1,000 of the animal population of this country have been infected with the latter, the pre-war estimate was that 40 per cent of the Dairy Herd were reactors, and we cannot, now or after the war, hope to be able to do without at least 40 per cent of our milk supplies even if it carry a risk of infection! Nor is there any real need for slaughter. Tuberculosis milk, if used for manufacture into Cheese, Condensed Milk or Milk Powder, or if used for Cooking in the home, is perfectly safe, and these accounted before the war for about 35% of the milk that was home produced. If the reactor's milk can be segregated there *is* a use for it. The problem is then one of the segregation of odd reacting cows scattered through the herds of the country. Many farmers with two farms under their control have already found a way out in their own business. They keep two herds, one T.T., the other not—and a reactor in the former simply joins the latter. A scheme might well be evolved to establish in suitable areas, under co-operative or state control, reacting herds to which all reactors would be sent. Individual farmers need not lose ownership of the cows if they wish, since milk records could be kept and the proceeds credited to the owner. The whole of the output of these farms (preferably run on a bail system since the population might be very fluctuating) would be sold for manufacture or for cooking. A very much lower 'manufacturing' price would then have some economic justification. The possibilities of carrying out such a scheme, even in war-time, are great, and in its absence all the efforts to increase the global output of T.T. milk are vitiated by the fact that a 'reactor' sold by progressive Farmer A is bought by backward Farmer B and its milk merely goes down a different consumer's throat.

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[1] For tenant farmers, the difficulty was often to persuade the landlord to improve the buildings. More success was achieved with the Accredited Scheme, for which a bonus of 1d. a gallon was paid. Bridges also shows that the extra costs involved for these producers were much less than the Bonus. Accredited producers are included in the 'wholesale' group in the above comparison.

[2] The public are probably now more aware of the importance of T.T. milk, and less easily discouraged by disparaging remarks on the part of the retailer. A larger margin for the retailer on sales of T.T. milk (financed by subsidy from the Treasury) might also be very effective in persuading him to push its sales during the transition period, particularly if he is a producer-retailer and qualified for both subsidies.

R. S. G. RUTHERFORD,
Agricultural Economics Research Institute.

CLOTHING SHOPS IN THE UNITED KINGDOM

In May 1942 all traders in the United Kingdom handling goods controlled by the Consumer Rationing Order were required to open a coupon account at a bank. The immediate object was, of course, to simplify the transfer of clothing coupons from retailers to wholesalers, and to check the use of forged coupons. But, from the forms of application submitted by retailers (mostly in May, June and July 1942) the Board of Trade has been able to compile some very interesting statistics of the number of clothing shops and of their types and sizes.[1]

THE NUMBER OF CLOTHING SHOPS

86,150 retail shops opened coupon accounts: 81,000 were primarily engaged in selling rationed clothing and textiles,[2] while the remaining 5,000 dealt with them only as a side-line. It appears that possibly 10 per cent of the shops (i.e. about 9,000) selling mainly rationed goods did not open accounts, being, of course, mainly very small ones: there may be in addition a large number of shops selling small quantities of clothing as a side-line which did not open accounts either. Thus in 1942 there were in the United Kingdom some 90,000 shops selling mainly clothing and textiles, 5,000 others selling as a side-line sufficient clothing to justify opening a coupon bank account, and an unknown number of shops selling, as a side-line, small quantities of rationed goods. If we assume that the ratios hold good for England and Wales only, the number of clothing shops in this smaller region in 1942 were 77,000 selling mainly textiles, clothing and footwear, 4,700 selling as a side-line sufficient to justify a coupon account, and an unknown number of others selling only small quantities as a side-line. Mr. Henry Smith estimated, on the basis of the Population Census, the number of textile and other clothing shops in England and Wales in 1931 as 74,000 and boot and shoe shops as 12,900.[1] These estimates for 1931 probably err on the high side, and, of course, the classifications were probably not the same in the Census as they were for coupon banking (the former probably includes specialist hat shops and shops selling furnishing fabrics, for example). On balance it would seem that there was not much change in the total number of clothing and footwear shops between 1931 and 1942. If anything, there was a slight decline, which might be due both to the rapid growth of the big 'mass production' clothing retailers in the 'thirties and to some elimination of small retailers during the war.

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[1] *Retail Outlets for Rationed Clothing, Footwear and Textiles*, Board of Trade Journal, 3rd June, 1944.

[2] Clothing, footwear, hand-knitting yarn and dress materials. Shops selling furnishing fabrics, which were not rationed in mid-1942, and specialist hat shops are excluded from the statistics.

ANALYSIS BY ECONOMIC TYPE AND GENERAL DESCRIPTION

The Board of Trade provides an analysis of clothing and footwear shops by economic type. Multiples are defined as firms with more than five branches, but excluding co-operatives. Co-operatives in the following statistics mean the number of shops—the number of separate departments selling clothing and footwear was certainly greater. The analysis refers to the 86,150 shops applying for coupon accounts.

Economic Type of Shops Selling Textiles, Clothing and Footwear

	Number *	%
Multiple Shops	8,250	10
Co-operative Shops	2,460	3
Independent		
(*a*) wholly or mainly clothing	70,440	81
(*b*) other	5,000	6
	86,150	100

* From the context it appears that a Multiple firm with, say, 15 separate branches is counted as 15 shops. Co-operatives are measured by addresses: the number of separate departments is greater (see above).

It is pointed out that the multiples and co-operatives fall almost entirely in the two upper turnover classes (see below), and that their average turnover is greater than that of the independents.

From the forms of application the Board of Trade has classified the shops according to the line of goods sold. In addition a sample examination of the returns was made and a classification according to the 'General Description of Shop' was made. Where the numbers of shops in groups, derived from the sample, are comparable with the known actual numbers, the agreement is very close. We give here, therefore, only the results of the sample (the margins of error given represent 87 chances in a 100 that the true figures lie within the limits stated).

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[1] *Retail Distribution*, p. 37. The number of shops selling mainly boots and shoes in 1942 was 10,000. To this must be added an allowance for retailers without coupon accounts.

Estimated Number of Shops with Coupon Accounts, analysed according to General Description of Shop

General Description	*Numbers*
Drapery	35,800 ± 1,800
Outfitting (men's and/or women's)	15,900 ± 1,400
Footwear *	11,700 ± 1,200
Tailoring (men's and/or women's)	5,500 ± 900
Wool	2,500 ± 600
Costumiers and Gown Shops	1,900 ± 500
Variety Chain Stores	1,500 ± 500
Department Stores	300 ± 200
Co-operative Stores	2,300 ± 600
Other: Wholly or mainly clothing	3,600 ± 700
Other: Not wholly or mainly clothing	5,200 ± 800
Total	86,200

* Specialist shops: a large number of other shops sell some footwear.

TURNOVER AND SIZE OF SHOP

From the original returns, and from a sample of shops later requested to give in sterling (*i*) their total sales and (*ii*) their sales of rationed goods, it was possible to obtain a rough classification of the shops according to their value of total turnover, *including* unrationed goods. The three categories by turnover are (1) under £2,500 a year, (2) £2,500—£12,000 a year and (3) over £12,000 a year. These sizes correspond broadly 'with (1) under three assistants, (2) three to ten assistants and (3) over ten assistants, the term assistant including all persons serving in the shop.' For convenience we shall call these categories, small, medium and large. The summarised data are as follows :—

Number of Shops in the United Kingdom with Coupon Accounts

Lines of Rationed Goods Sold	*Total No. of Shops* (000)	*Percentages in each Category* 1 Small	2 Medium	3 Large
Drapers Goods only	24.7	59	35	6
Footwear only	11.9	35	55	10
Men's and Boys' clothing only	8.7	41	52	7
Drapers Goods *plus* footwear	1.5	60	30	10
Drapers goods *plus* men's and boys' clothing	18.7	52	41	7
Men's and Boys' clothing *plus* Footwear	1.4	43	50	7
General Clothing and Footwear	19.1	41	45	14
Total	86.1	48	43	9

The proportion of general clothing shops (14%) in the top category, £12,000 and over, is relatively high, because it contains the department and variety stores. The figures given in the Table refer only to those shops which applied for coupon accounts. 'If the 10 per cent of clothing shops which did not open accounts are added into the lowest turnover class (where they are almost bound to belong) the proportion would be 53 per cent with total sales under £2,500 p.a., 39 per cent of medium size (£2,500—£12,000) and 8 per cent with a total turnover exceeding £12,000 p.a.' The distribution of *sales* between the categories is, of course, radically different. Of the total sales of the 86,000 shops included in the

Table, shops in the large category accounted for about two-thirds, the medium shops for about one quarter and the small shops for under 10 per cent. The addition of the 9,000 or so clothing shops, which did not open coupon accounts, to the lowest class cannot alter these proportions significantly: the more especially since they are likely to be generally smaller in size than the average small clothing shop. Let us take for the grand total of 95,000[1] shops selling clothing the proportion of *sales* accounted for by the three categories as 65, 25 and 10 per cent respectively. According to the White Paper (Cmd. 6520) the total sales of Clothing in 1942 were £485 millions. This figure probably needs to be increased somewhat to give the total sales (including unrationed goods). of the clothing shops: we shall take as a first approximation £500 millions Then the total value of sales of the three categories were: large shops: £325 millions, medium shops: £125 millions, small shops: £50 millions a year. The *average* annual turnover in the three categories were therefore: £43,000, £3,400 and £1,000 respectively: the average turnover of *all* shops was £5,300 a year. These figures for the average turnover in the three categories are, of course, only rough approximations, because we do not know what allowance to make for the sales of unrationed goods. But even a considerable error in this allowance would only affect the top class of shops slightly, the medium class less, and the lowest class hardly at all. The result is striking. Two-thirds of all clothing is sold by a relatively small number (about 8,000) of large shops (mainly multiples, department stores and co-operatives) with an average annual turnover of over £40,000. A quarter is sold by about 37,000 medium shops, with an average turnover of about £3,400 a year. Over 50,000 small shops, more than half the total *number* of shops, account for only 10 per cent of sales, and their *average* turnover is only £1,000.

The *net* income from the small shops could be calculated if we knew the average 'mark-up' of clothing retailers and also the proportion of operating costs to gross income. It is reasonable to suppose that the 'mark-up' lies between 30 and 50 per cent of the retail price; so that the average gross income of the small shops would be £400 (± £100). This must cover rent, rate, fuel and light, as well as the wages of any assistants. Very tentatively it would seem that the order of magnitude of the average net income from more than half the shops[2] selling clothing in this country in 1942 was £200—£400 a year. The figure for before the war would be a little lower, the value of sales in 1942 being *increased*, despite the fall in volume.

REGIONAL DISTRIBUTION AND POPULATION SERVED

The various types of clothing shop have been classified by the Board of Trade according to Civil Defence regions. Broadly speaking mixed shops are more numerous in the North than in the South. Specialist shops, particularly men's and boys' clothing, are more frequently found in London and the South than elsewhere.[3]

The concentration of the larger shops in towns and cities is to be expected. The classification this time is according to the coupon takings: it appears, however, that this classification is broadly the same as that so far used of turnover. While 8 per cent of shops in large towns, with over 100,000 population, are in category 3 (large shops) and 56 per cent are in the smallest category, in rural areas and small towns (less than 10,000 population) only 2 per cent of shops can be classed in the largest category and 71 per cent are in the smallest group.

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[1] Ignoring the shops selling clothing as a sideline which did not open accounts.

[2] i.e. shops in the lowest turnover category.

[3] Except that Scotland, Wales and Northern Ireland all have *more* than the average number of specialist footwear shops.

We give below a summary of the Table showing the number of shops in the various Civil Defence regions and also the average population served per shop. The 'population' is the number of registrations for sugar in the various regions. The 'population,' so defined, thus does not correspond exactly with the number of persons living in any given area.

Buying Population Served per Shop with Coupon Account, By Regions†*

	No. of Shops	*Average Population per Shop‡*		
Region		*Large Towns*	*Remainder*	*Total*
London	8,381	504	652	533
South of England	21,319	526	577	567
Midlands and Wales	19,805	433	521	487
North of England	24,515	454	565	510
Scotland and N. Ireland	12,125	573	473	506
Total U.K.	86,145	482	547	521

*We have re-calculated the 'average population per shop' for London, and total U.K. from the original data in the Board of Trade Journal. There are some slight discrepancies, most of which may be accounted for by rounding off the population figures. The figure in Table IV for the population in the Eastern Region should clearly be 3,545 and not 4,545.

†The regions used here are groups of Civil Defence Regions: London; South (Eastern, South-Eastern, Southern, South-Western); Midlands and Wales (Midlands, North Midlands and Wales); North of England (North-Western, North-Eastern Northern); Scotland and North Ireland.

‡'Population' means the number of registrations for sugar in a given area.

The average number of persons served by a clothing shop in the United Kingdom is 521. We know that the large shops are concentrated in large towns, so that the figures for population served in large towns appear paradoxical. The explanation is, of course, that these shops serve many customers living outside the towns, so that the average number of persons *served* by a shop in a large town may be very much greater than the number of persons living in the town. In fact, since the 'population' is based on sugar registrations, the ratio of persons *living* in large towns to the number of shops in these towns might be a little smaller than is indicated by the figures in the above Table. 'Broadly, there are more shops in the Southern half of the country than in the Northern—the reflection among other things of a tendency to bigger shops in the South than in the North, partly accounted for by the greater proportion of multiples there.'

G. D. N. Worswick.

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